FHWA: Evaluations of Innovative Intersection Designs for Pedestrian and Bicyclists

Kay Fitzpatrick, TTI, PI
Wei Zhang, FHWA, TOCOR

June 10, 2020
Goals and Objectives

- Formal evaluation of innovative intersection retrofitting designs aimed at improving the safety of pedestrians and bicyclists
  - Synthesis of design treatments
  - Site identification
  - Before – after evaluation at 15 sites
  - Training course, ½ day
Treatments

(identified via discussions at NCUTCD, TRB, FHWA Panel, Research Team’s review of existing sites and literature review)
Existing: W Broadway & S 200 W, Salt Lake City, UT

- Corner islands
- Green crossbike (also called conflict markings)
- Green pavement markings (bicyclist forward queuing area)
Existing: W Broadway & S 200 W, Salt Lake City, UT

- Corner islands
- Green crossbike (also called conflict markings)
- Green pavement markings (bicyclist forward queuing area)
Existing: The Alameda & Hopkins St, Berkley, CA

- Corner islands
- Bend-in/bend-out adjusts bike lane position near intersection / slow bicyclists
Looking for Study Sites
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kickoff</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Synthesis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Select Treatments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Evaluation (5 sites)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Documentation/Training</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Evaluation (10 sites)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Timing for Evaluations with respect to construction**

- **4 & 6** before collection (construction not yet started)
- **4 & 6** hold for construction (6-12 months typical)
- **4 & 6** after collection / reduction / analysis
Criteria for Site Selection

Required:
- Construction within acceptable timeframe (not too soon to allow before data collection and finish in time to allow after data collection)
- No significant other geometric changes (e.g., adding lanes)
- One-way separated bike lanes present on approaches

Preference:
- Physical changes rather than just signal changes
- Treatments installed at all four corners

<table>
<thead>
<tr>
<th># Sites</th>
<th>Meet Criteria</th>
<th>Accepted</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Looking for Study Sites

- Presentations
  - NCUTCD Bicycle Technical Committee
  - NCUTCD Pedestrian Task Force
  - TRB Pedestrian Committee
  - TRB Bicycle Committee
  - Vendors at ATSSA
  - ELCSI-PFS TAC meeting (6/10/20)

- Social media
  - ITE Community
  - ITE Spotlite and ITE Journal
  - PBIC Facebook (reported as having above average engagement with over 2000 views, 160 clicks, 20 shares)
  - ITE Facebook

- Emails
  - NCUTCD Pedestrian Task Force, entire group
  - TRB Pedestrian Committee, entire committee
  - AASHTO State Bicycle and Pedestrian Coordinators (54 members)
  - Walk Friendly Communities
  - Traffic Control Device Pooled Fund members (via Laura Mero)
  - NACTO (via Matthew Row)
  - Cities identified from Google Searches (e.g., Charlotte North Carolina and Seattle)
Potential Study Sites

Cities that may be installing…but, no specific intersections identified yet

- Charlotte, NC
- New York City, NY
- San Francisco, CA
- Santa Monica, CA
- Minneapolis, MN
- Florida DOT
Potential Study Sites

Found to date:
30 intersections with upcoming construction but

- Outside available timeline
- Not meeting other criteria

- Austin, TX: 4 intersections
- Austin, TX: 2 intersections
- Bethesda, MD: 1 intersection
- Boston, MA: 1 intersection
- Cambridge, MA: 2 intersections
- Dallas, TX: 5 intersections
- Fremont, CA: 2 intersections
- Pittsburg, PA: 6 intersections
- Portland, OR: 1 intersection
- Salt Lake City, UT: 1 intersection
- San Jose, CA: 3 intersections
- Seattle, WA: 1 intersection
- Silver Spring, MD: 1 intersection
Planned: Fremont Blvd & Mowry Ave, Fremont, CA

Treatments include:
• Corner islands
• Bend out / bend in
• Bicyclist yield lines
• Forward yielding areas for bicyclists
• Crossbike markings
Next Step
Near Term

Next Steps

• Finalize the selection of treatments / designs / study sites / promotional material (Task 3) – due 6/30/20
  • Need to identify more sites – help please!
• Refine data collection plans / work with cities / collect data (Task 4)
  • Fremont, CA in July or August (compromise between non-typical traffic patterns & start of construction)

Wei Zhang, FHWA
Wei.Zhang@dot.gov

Kay Fitzpatrick, TTI
k-fitzpatrick@tamu.edu
Poll Questions
FHWA: Safety Evaluations of Innovative Intersection Designs for Pedestrian and Bicyclists

Introduction

Many transportation agencies are increasing their emphasis on improving pedestrian and bicyclist safety and reducing the risk of a fatality or serious injury to these users. Recently, many innovative intersection designs aimed at accommodating multimodal transportation, reducing conflicts between moving vehicles and vulnerable road users, and lowering the impact force (reducing vehicle speed and changing collision angle in the event of collision), have been conceived and implemented. In the United States, other names being used for these innovative intersections include protected intersections and dedicated intersections. In concept, these designs utilize a suite of treatments working in concert that should improve conditions for pedestrian and bicyclists; however, documented improvements are rare or nonexistent. The goal of this FHWA project is to address this gap.

Project Objectives

The objectives of this FHWA project are to:

1. Conduct synthesis of innovative intersection retrofitting designs.
2. Identify existing sites and sites where implementation of an innovative intersection design is planned for the next 12 to 18 months (e.g., construction starting no early than July 2020 and ending no later than December 2021).
3. Select sites for formal evaluations. Collect data both before and after implementation of the retrofitted design.
4. Evaluate the operational and safety improvements of the selected designs.
5. Develop a half-day training course.

Project Schedule

The project is anticipated to be completed by September 2022. Before and after data are to be collected between now and March 2022. The Project Team is interested in sites where implementation of the design will be complete by December 2021.

Contacts for Additional Information

Kay Fitzpatrick
Texas A&M Transportation Institute
k-fitpatrick@tamu.edu

Wei Zhang
Federal Highway Administration
Wei.Zhang@dot.gov

The overall project goal is a formal and comprehensive evaluation of select innovative intersection retrofitting designs aimed at improving the safety of pedestrians and bicyclists while maintaining an acceptable level of service to motorized traffic.